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Summary.

| | |
|-------------------------------|-----|
| Residents | 23 |
| Summer Residents | 57 |
| Winter Sojourners | 20 |
| Migrants | 68 |
| Occasional Visitors | 40 |
| <hr/> | |
| Total | 208 |

NOTES ON RECOGNITION MARKS IN CERTAIN SPECIES OF BIRDS.

BY JOHN TREADWELL NICHOLS.

IN 'Bird-Lore' for December, 1901, Ernest Thompson Seton published an article on recognition marks in animals. The subject has interested me ever since, and I have tried to explain by that hypothesis some of their colors as seen in the field.

It is frequently urged that the build, motions, and general appearance of a bird are what we, and doubtless also its associates, use in recognizing it. This certainly is often true; but on careful analysis, it is found that in many species it is some definite, conspicuous bit of color which catches the eye and gives them away. It is the dark back, sharp breast line and white outer tail feathers that demonstrate the Junco in the sparrow-filled shrubbery. A year ago this summer I had my first meeting with the Bohemian Waxwing in the Canadian Rockies. Of course we all know the chestnut under tail-coverts of this species are a conspicuous mark with the bird in the hand, but I was surprised to find how conspicuous they were in the field. As the birds took flight they were very noticeable, and this mark which so definitely separated the species from the allied Cedar Waxwing common in the same region, is doubtless of use to the birds themselves as well as to the human observer.

But aside from these one or two land birds, I wish to speak particularly of two groups of water birds,— the Albatross-Petrel group and the Shore Birds. Some years ago I spent some time studying the first at sea in the southern hemisphere where many species abound. The habit of life of all is similar. They fly constantly about close to the ocean surface looking for food. Often they must go some time without food, and doubtless when they do find it, it is as frequently in superabundance,— perhaps a school of fish, or squid, or a dead whale. Then they gather from all about to the feast. They have few enemies. Obviously a strong advertising coloration would be of advantage to such birds, coupled with recognition marks, as the food of the different species would be somewhat different. I found that the definite color patterns of the different species were most useful in separating them. The black and white Cape Pigeon has a color pattern at once conspicuous and diagnostic, differentiating it at any distance from the numerous petrels of similar size and flight found in the same regions. The gray-backed Slender-billed Fulmar has a light patch on the wing which is conspicuous and diagnostic when the bird is in flight. In southern seas there are many petrels of about the size of a Cape Pigeon, dark above and white below, with dark under surfaces to the wings, whose plumage differs only in minor details. The feeding habits of the different species are doubtless alike, as they all follow a ship but rarely take a baited hook, which the Cape Pigeon and Slender-billed Fulmar do greedily, and which accounts for the disproportionate abundance of these two species in collections. Apparently the general type of color mentioned is a recognition mark shared by a number of species of similar habits. That this is true is made more probable by the fact that a markedly different type of plumage characterizes one or more species of petrels of about the same size and appearance otherwise but of quite different feeding habits which were observed at a distance or near to, going about their business, often in flocks and not coming about or paying attention to the ship. They had a great deal of white on the under surfaces of the wings, and the white of the breast running up towards the nape, marking off the dark top of the head from the remainder of the dark upper parts. Very probably part of them at least were the Greater Shearwater,

a species which should have been in southern waters at the season when they were observed there. When one was seen at a distance it was recognized at once by its striking color scheme, and I knew that though its course might lie across that of the ship it would not come about or follow her.

Then there are small albatrosses resembling one another in size and doubtless in feeding habits, belonging to *Diomedea* and *Thalas-sogeron*, collectively called "Molly-hawk" by sailors. They have the same type of coloration, white with a blackish mantle solid across the back, whereas the large Albatross *Diomedea exulans*, which has somewhat different habits on account of its much greater size, has the center of the back white. Although the large Albatross is of quite different build from the smaller ones, at long and uncertain range this difference of pattern was found to be the readiest and surest way of identifying it.

The sailing flight characteristic of petrels and albatrosses, in which the bird glides inclined first to one side, then to the other, displays particularly well the patterns of both upper and lower surfaces. The white rump of the Mother Carey's Chickens is not noticeable among the white-caps when the birds flit aimlessly hither and thither, but when they fly steadily in one direction, their unchanging position makes them conspicuous from the rear. At times one sees streams of Mother Carey's Chickens flying swiftly and steadily in one direction, quite unlike their usual custom. I fancy that if any delectable food becomes available, birds at a distance see others go to it and fly towards them, and we presently have streams of birds flying towards it from all the surrounding sea. When *Fregetta grallaria* gather to feed, the white rumps and lower surfaces of the high-held wings make a twinkling white effect conspicuous at considerable distance.

To turn to an entirely different group of birds, the writer has in the past few months had much experience with the Limicolæ. These are mostly flocking species, usually strong flyers, and preyed upon to an unusual degree by hawks, which attack them from above. In the main the species are concealingly colored. The Woodcock and Wilson's Snipe are particularly so. The Ring-neck and Piping Plovers match admirably the flats and dry sand they respectively frequent. The Semipalmated and Least Sandpipers

are very inconspicuous from above, even when moving actively about on mud flats. The color of a Yellow-leg I recently observed sitting quietly at the edge of a bit of marsh rendered it very inconspicuous, and I have seen a White-rump when startled, crouch down concealing the bulk of the dead white underparts and practically disappear against the brightly lighted mudflat on which it had been feeding. The Sanderling, which frequents the bright lights of the ocean line, is lighter colored than usual.

Yet most of the species when on the wing are conspicuous, and then, or particularly when starting to fly, show colors as clearly of recognition value as the diagnostic whistles of many species.

The writer finds the sharply contrasted black and white colors of the Sanderling's wing the best field mark to determine that species in any plumage. The White-rumped Sandpiper, a non-committal enough looking bird on the ground, is easily recognized by its white rump as it takes wing. Its tail is darker than usual in the group and emphasizes the white rump. The narrow white line in the wing of the Spotted Sandpiper has a different look from that of any other species, and the blackish under wing surfaces of the Solitary Sandpiper are at once an infallible and conspicuous criterion of that species. The black patch under the wing of the Black-breasted Plover, which distinguishes young and fall birds from the Golden Plover, is much more conspicuous than one would think. Only recently the writer was observing one on a distant tussock which he could not be sure was even a plover. As it took flight this mark could be seen and its *pe-a-we* note also proclaimed it.

There seems to be no good long-distance mark for telling Semipalmated from Least Sandpipers; with us they perhaps occur in mixed flocks, and need none. The white under-surfaces of a compact, swiftly moving flock of these birds showing conspicuously at intervals perhaps has some recognition and directive significance.

Few birds are as consistently concealingly colored as the Woodcock. Perhaps the whistling of its wings as it rises takes the place of recognition marks of other species.

At any rate advertisement is so common in animals that it is hard to believe it has no particular value to them. In the Canadian Rockies three species of mammals sometimes occur living in

close proximity, marmots, coneys, and a spermophile, striped something like a high-colored chipmunk. The marmots and coneys, harmonizing in color with the gray rock slides, are continually advertising their presence by persistent whistling and bleating. The conspicuously colored spermophile is silent.

In conclusion, the writer's observations foster the belief that advertising and concealing colors, each in its own way, are of value to a bird, and that the bird's plumage is determined as a compromise between the two adapted to its particular needs and habits. Probably there are other forces also acting more or less to determine the colors, as adaptation to light. Birds living in insufficient light have, as a rule, dark colors which absorb, those in superabundant light, lighter colors which repel it.